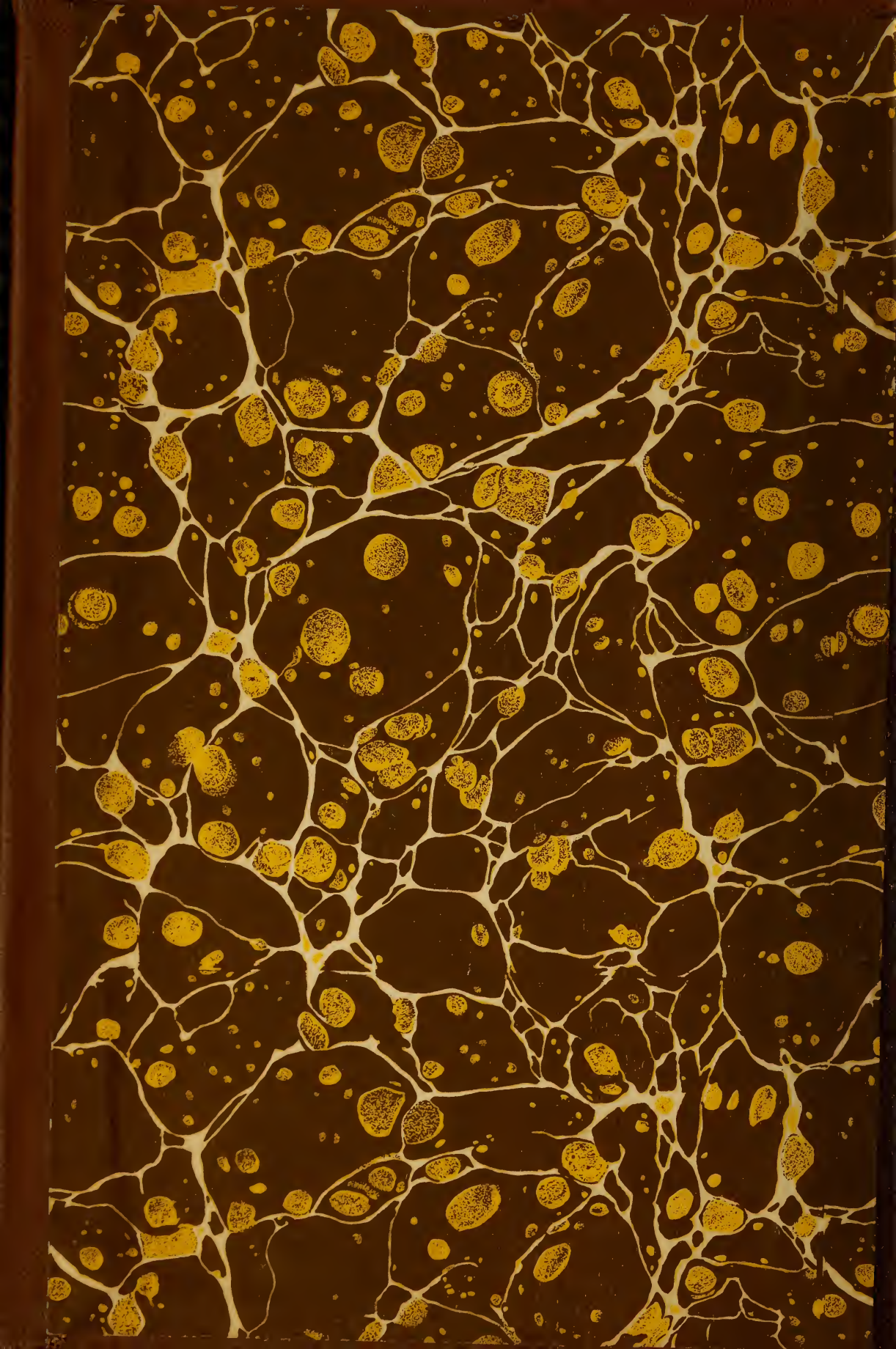
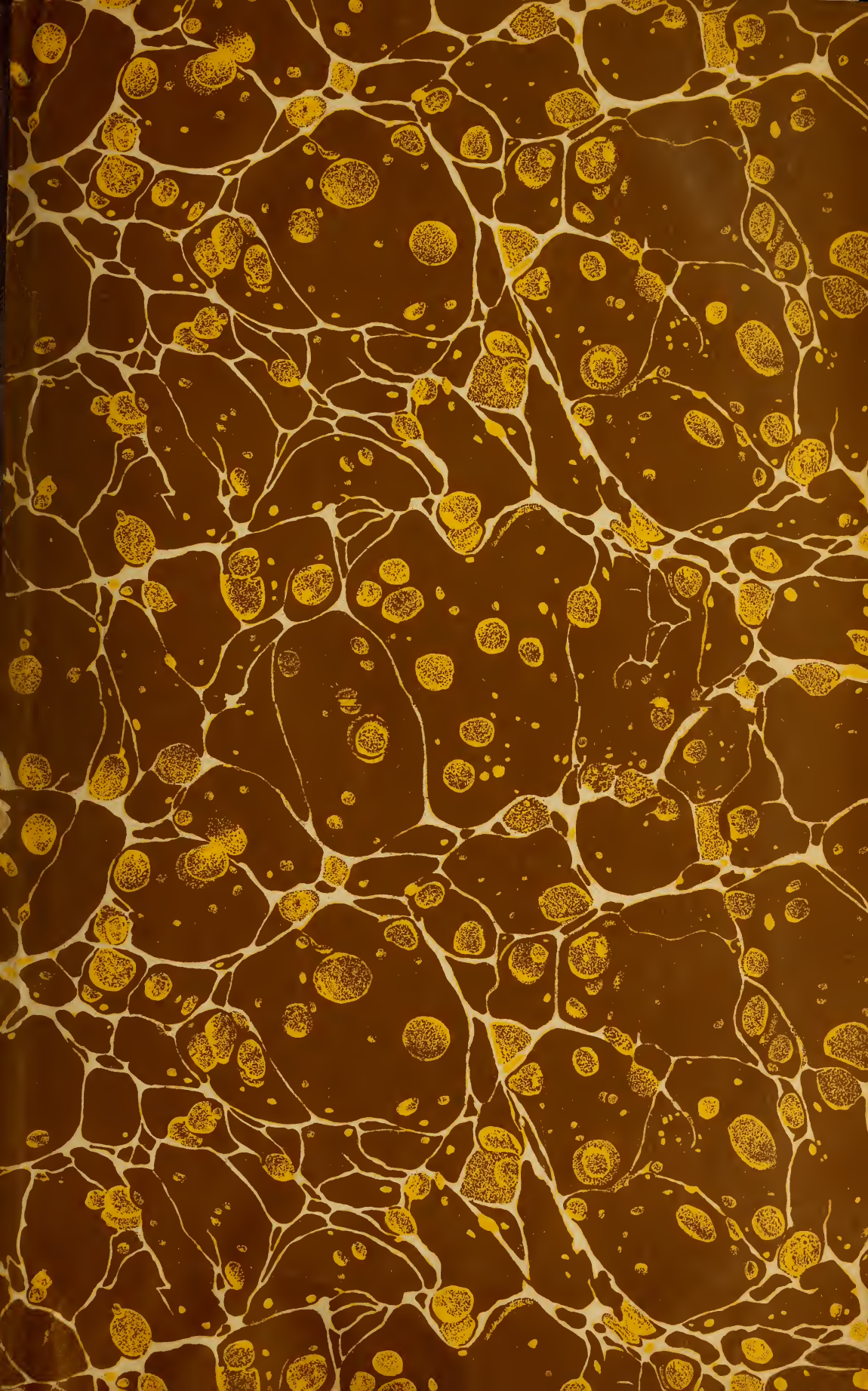
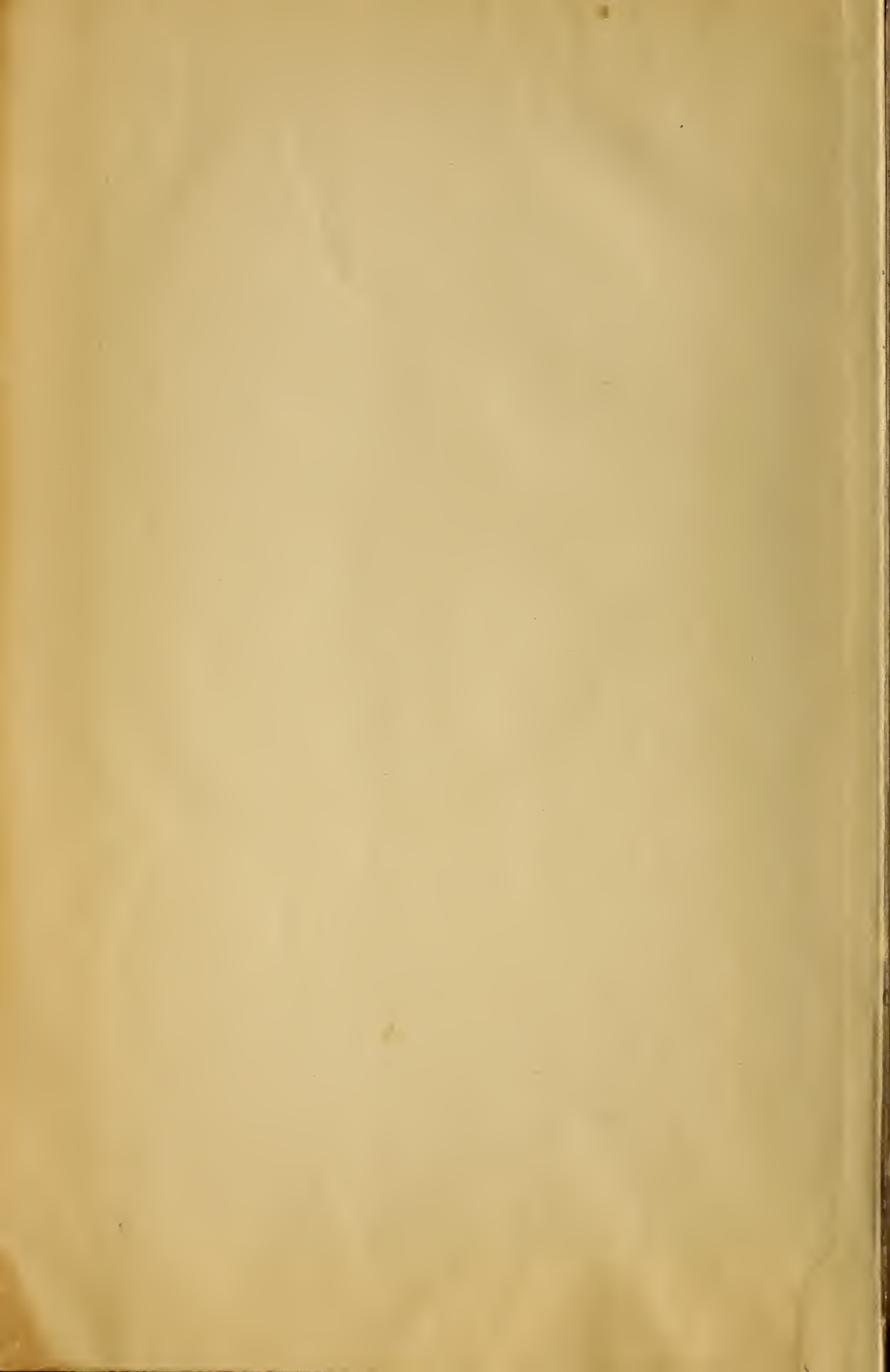


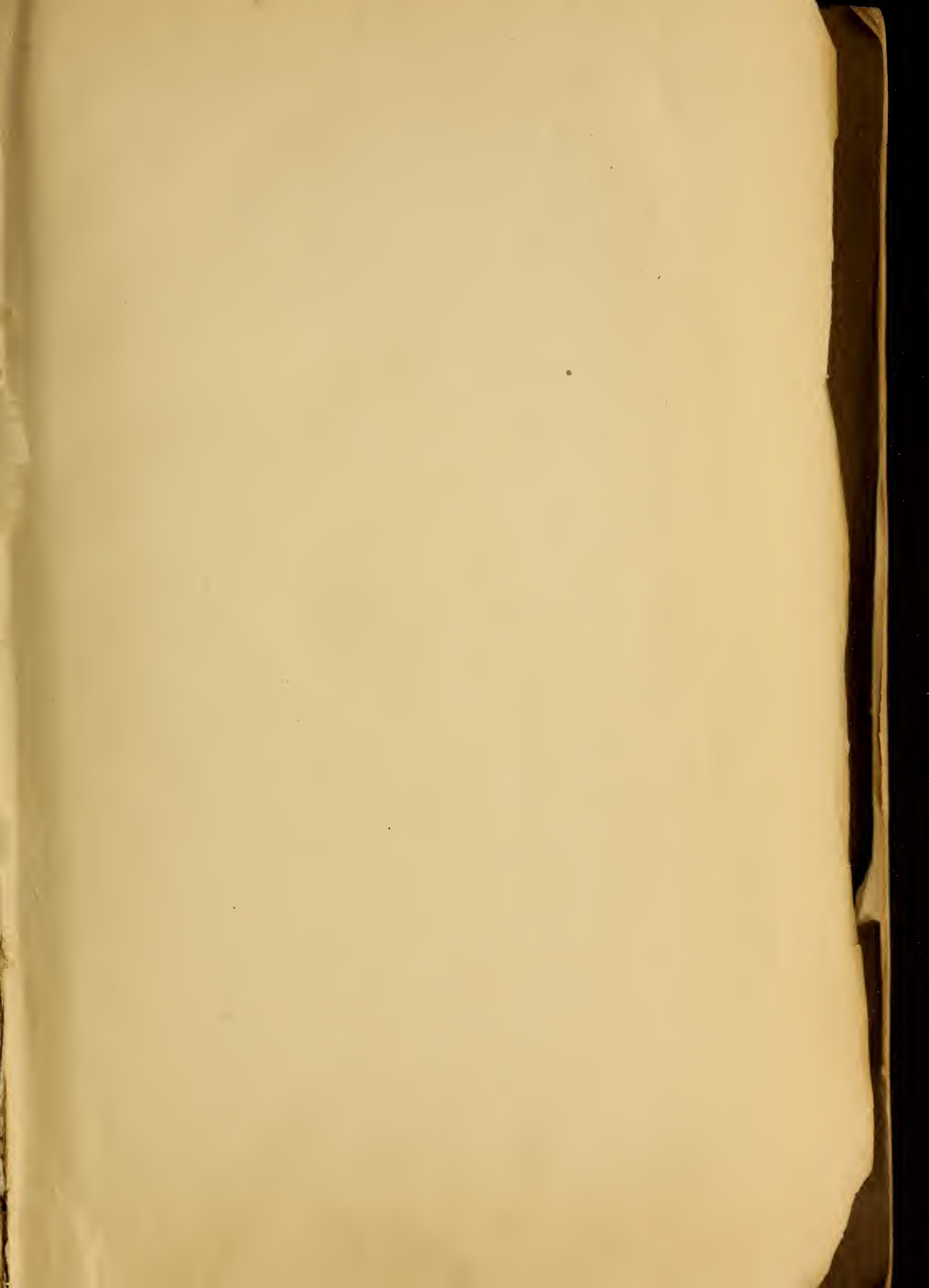
MISCELLANEOUS PUBLICATIONS
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UNITED STATES DEPARTMENT OF COMMERCE
BUREAU OF STANDARDS

**AMERICAN NATIONAL
SCREW THREAD TABLES
FOR SHOP USE**

II. Special Threads

MISCELLANEOUS PUBLICATION OF THE BUREAU OF STANDARDS, No. 99

E R R A T A

B. S. Misc. Pub. No. 99.

| Page | Table | Column | Line (below heading) | Incorrect value | Correct value |
|------|-------|--------|----------------------------|--------------------|------------------|
| 4 | 88 | 7 | 2 | .7493 | .7943 |
| 5 | 88 | 16 | 12 | 1.3 09 | 1.3209 |
| 8 | 27 | 4th | 7 | .0080 | .0086 |
| 10 | 28 | 5th | 29 | .0079 | .0079 |
| 14 | 29 | 9th | 20 | .0199 | .0179 |

PLANTAS

PLANTAS DE LA ZONA

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UNITED STATES DEPARTMENT OF COMMERCE

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BUREAU OF STANDARDS

GEORGE K. BURGESS, Director

MISCELLANEOUS PUBLICATION OF THE BUREAU OF STANDARDS, No. 99

AMERICAN NATIONAL SCREW THREAD TABLES FOR SHOP USE

II. Special Threads

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AMERICAN NATIONAL SCREW-THREAD TABLES FOR SHOP USE

II. SPECIAL THREADS

ABSTRACT

This publication presents in compact form the tables of dimensions of special screw threads having the American National form of thread (60°), as published in the 1928 Report of the National Screw Thread Commission (Secs. IV and XD), Bureau of Standards Miscellaneous Publication, No. 89.¹ These tables cover the basic sizes, limiting dimensions, and tolerances for the American National 12-pitch thread series and other screw threads of special diameters, pitches, and lengths of engagement.

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I. AMERICAN NATIONAL 12-PITCH THREAD SERIES

Where special threads are required, it is sometimes essential to select a certain pitch as standard for a range of sizes. Also, in general practice, where the pitch of a special thread is optional, the uniform use of a selected pitch is advantageous. For such applications the 12 pitch is widely used, particularly for two distinct purposes as given below, but for different reasons.

Sizes of 12-pitch threads from one-half inch to and including $1\frac{3}{4}$ inches are used in railroad practice, which requires that worn stud holes be retapped with a tap of the next larger size, the increment being one-sixteenth inch throughout most of the range.

The 12-pitch threads are also widely used in machine construction, as for thin nuts on shafts and sleeves. From the standpoints of good design and simplification of practice, it is desirable to maintain shoulder diameters to one-eighth-inch steps. The 12 pitch is the coarsest, for a thread of basic depth, which will permit a threaded collar which screws onto a threaded shoulder to slip over a shaft, the difference in diameter between shoulder and shaft being one-eighth inch.

¹ The complete report may be procured from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C., at 50 cents per copy.

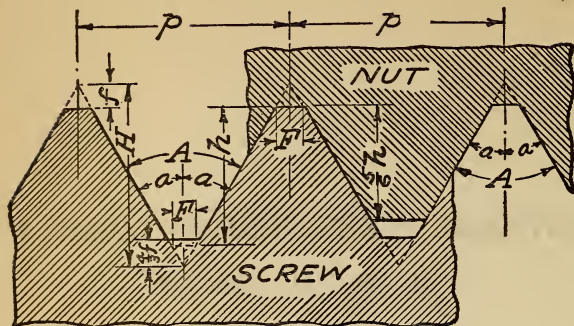


FIG. 3.—American National form of thread

NOTE.—No allowance is shown. This condition exists in class 2, free fit, and class 3, medium fit, where both the minimum nut and the maximum screw are basic.

NOTATION

n = number of threads per inch
 H = $0.866025 p$, depth of 60° sharp \vee thread
 h = $0.649519 p$, depth of American National form of thread
 $\frac{5}{8}h$ = $0.541266 p$, maximum depth of engagement

F = $0.125000 p$, width of flat at crest and root of American National form
 f = $0.108253 p$
 $= \frac{1}{8}H$
 $= \frac{1}{8}h$ } depth of truncation

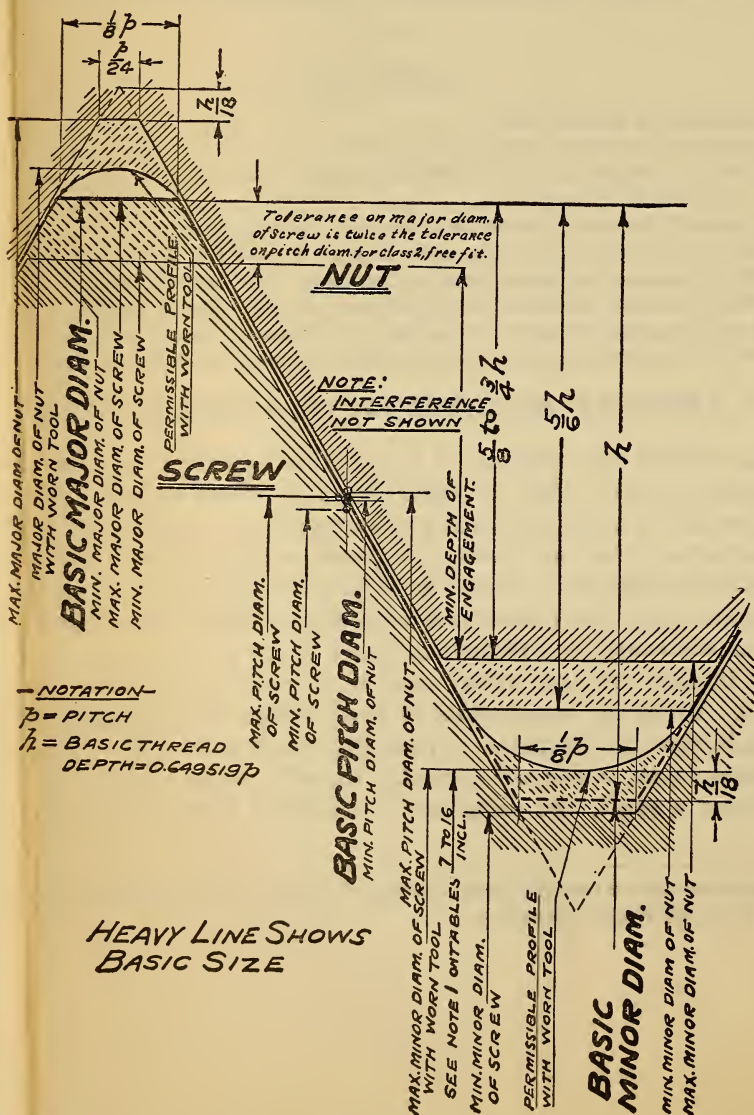


FIG. 10.—Illustration of tolerances and crest clearances for class 3, medium fit

TABLE 87.—American National 12-pitch thread series

| Identification | | Basic diameters | | | Metric equivalent of major diameter |
|--------------------|------------------|----------------------------|----------------------------|----------------------------|-------------------------------------|
| Sizes | Threads per inch | Major diameter <i>D</i> | Pitch diameter <i>E</i> | Minor diameter <i>K</i> | |
| 1 | 2 | 3 | 4 | 5 | 6 |
| | | <i>Inches</i> | <i>Inches</i> | <i>Inches</i> | <i>mm</i> |
| 1/2 | 12 | 0.5000 | 0.4459 | 0.3917 | 12.700 |
| 5/16 ¹ | 12 | .5625 | .5084 | .4542 | 14.288 |
| 3/8 | 12 | .6250 | .5709 | .5167 | 15.875 |
| 11/16 | 12 | .6875 | .6334 | .5792 | 17.463 |
| 3/4 | 12 | .7500 | .6959 | .6417 | 19.050 |
| 13/16 | 12 | .8125 | .7584 | .7042 | 20.638 |
| 7/8 | 12 | .8750 | .8209 | .7667 | 22.225 |
| 15/16 | 12 | .9375 | .8834 | .8292 | 23.813 |
| 1 | 12 | 1.0000 | .9459 | .8917 | 25.400 |
| 1 1/16 | 12 | 1.0625 | 1.0084 | .9542 | 26.988 |
| 1 1/8 ² | 12 | 1.1250 | 1.0709 | 1.0167 | 28.575 |
| 1 3/16 | 12 | 1.1875 | 1.1334 | 1.0792 | 30.163 |
| 1 1/4 ² | 12 | 1.2500 | 1.1959 | 1.1417 | 31.750 |
| 1 5/16 | 12 | 1.3125 | 1.2584 | 1.2042 | 33.338 |
| 1 3/8 | 12 | 1.3750 | 1.3209 | 1.2667 | 34.925 |
| 1 1/2 ² | 12 | 1.5000 | 1.4459 | 1.3917 | 38.100 |
| 1 3/4 | 12 | 1.7500 | 1.6959 | 1.6417 | 44.450 |
| 2 | 12 | 2.0000 | 1.9459 | 1.8917 | 50.800 |
| 2 1/4 | 12 | 2.2500 | 2.1959 | 2.1417 | 57.150 |
| 2 1/2 | 12 | 2.5000 | 2.4459 | 2.3917 | 63.500 |
| 2 3/4 | 12 | 2.7500 | 2.6959 | 2.6417 | 69.850 |
| 3 | 12 | 3.0000 | 2.9459 | 2.8917 | 76.200 |

¹ Standard size of the American National coarse-thread series.

² Standard size of the American National fine-thread series.

TABLE 88.—Limiting dimensions and tolerances, classes 1, 2, 3, and 4 fits, American National 12-pitch thread series

| Dimensions and tolerances ¹ | Size, (inches) | | | | | | | | |
|--|--|-------------------|---------|---------|---------|---------|---------|---------|---------|
| | ½ | ¾ ² | ⅝ | ⅞ | 1 ¼ | 1 ½ | 1 ¾ | 2 ¼ | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| BOLTS AND SCREWS | | | | | | | | | |
| Class 1, major diameter | Max. <i>Inch</i> | 0. 4976 | 0. 5601 | 0. 6226 | 0. 6851 | 0. 7476 | 0. 8101 | 0. 8726 | 0. 9351 |
| | Min. | . 4818 | . 5443 | . 6068 | . 6693 | . 7318 | . 7943 | . 8568 | . 9193 |
| | Tol. | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 |
| Classes 2, 3, and 4, major diameter | Max. | . 5000 | . 5625 | . 6250 | . 6875 | . 7500 | . 8125 | . 8750 | . 9375 |
| | Min. | . 4888 | . 5513 | . 6138 | . 6763 | . 7388 | . 8013 | . 8638 | . 9263 |
| | Tol. | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 |
| Class 1, minor diameter | Max. ⁴ | . 3954 | . 4579 | . 5204 | . 5829 | . 6454 | . 7079 | . 7704 | . 8329 |
| | Classes 2, 3, and 4, minor diameter | Max. ⁴ | . 3978 | . 4603 | . 5228 | . 5853 | . 6478 | . 7103 | . 7728 |
| Class 1, loose fit, pitch diameter | Max. | . 4435 | . 5060 | . 5685 | . 6310 | . 6935 | . 7560 | . 8185 | . 8810 |
| | Min. | . 4356 | . 4981 | . 5606 | . 6231 | . 6856 | . 7481 | . 8106 | . 8731 |
| | Tol. | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 |
| Class 2, free fit, pitch diameter | Max. | . 4459 | . 5084 | . 5709 | . 6334 | . 6959 | . 7584 | . 8209 | . 8834 |
| | Min. | . 4403 | . 5028 | . 5653 | . 6278 | . 6903 | . 7528 | . 8153 | . 8778 |
| | Tol. | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 |
| Class 3, medium fit, pitch diameter | Max. | . 4459 | . 5084 | . 5709 | . 6334 | . 6959 | . 7584 | . 8209 | . 8834 |
| | Min. | . 4419 | . 5044 | . 5669 | . 6294 | . 6919 | . 7544 | . 8169 | . 8794 |
| | Tol. | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 |
| Class 4, close fit, pitch diameter | Max. | . 4464 | . 5089 | . 5714 | . 6339 | . 6964 | . 7589 | . 8214 | . 8839 |
| | Min. | . 4444 | . 5069 | . 5694 | . 6319 | . 6944 | . 7569 | . 8194 | . 8819 |
| | Tol. | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 |
| NUTS AND TAPPED HOLES | | | | | | | | | |
| Classes 1, 2, 3, and 4, major diameter | Min. ⁵ | . 5000 | . 5625 | . 6250 | . 6875 | . 7500 | . 8125 | . 8750 | . 9375 |
| | Classes 1, 2, 3, and 4, minor diameter | Max. | . 4225 | . 4850 | . 5438 | . 6063 | . 6688 | . 7313 | . 7938 |
| Classes 1, 2, 3, and 4, pitch diameter | Min. | . 4098 | . 4723 | . 5348 | . 5973 | . 6598 | . 7223 | . 7848 | . 8473 |
| | Tol. | . 0127 | . 0127 | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 |
| | Min. | . 4459 | . 5084 | . 5709 | . 6334 | . 6959 | . 7584 | . 8209 | . 8834 |
| Class 1, pitch diameter | Max. | . 4538 | . 5163 | . 5788 | . 6413 | . 7038 | . 7663 | . 8288 | . 8913 |
| | Tol. | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 |
| Class 2, pitch diameter | Max. | . 4515 | . 5140 | . 5765 | . 6390 | . 7015 | . 7640 | . 8265 | . 8890 |
| | Tol. | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 |
| Class 3, pitch diameter | Max. | . 4499 | . 5124 | . 5749 | . 6374 | . 6999 | . 7624 | . 8249 | . 8874 |
| | Tol. | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 |
| Class 4, pitch diameter | Max. | . 4479 | . 5104 | . 5729 | . 6354 | . 6979 | . 7604 | . 8229 | . 8854 |
| | Tol. | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 |

Footnotes at end of table.

TABLE 88.—Limiting dimensions and tolerances, classes 1, 2, 3, and 4 fits, American National 12-pitch thread series—Continued

| Dimensions and tolerances ¹ | Size, (inches) | | | | | | | |
|---|--|-----------------------|---------|---------|---------|---------|---------|---------|
| | 1 | 1 1/16 | 1 1/8 | 1 1/4 | 1 3/8 | 1 1/2 | 1 5/8 | |
| 1 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | |
| BOLTS AND SCREWS | | | | | | | | |
| Class 1, major diameter..... | Max.... | 0. 9976 | 1. 0601 | 1. 1226 | 1. 1851 | 1. 2476 | 1. 3101 | 1. 3726 |
| | Min.... | . 9818 | 1. 0443 | 1. 1068 | 1. 1693 | 1. 2318 | 1. 2943 | 1. 3568 |
| | Tol.... | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 |
| Classes 2, 3, and 4, major diameter..... | Max.... | 1. 0000 | 1. 0625 | 1. 1250 | 1. 1875 | 1. 2500 | 1. 3125 | 1. 3750 |
| | Min.... | . 9888 | 1. 0513 | 1. 1138 | 1. 1763 | 1. 2388 | 1. 3013 | 1. 3638 |
| | Tol.... | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 |
| Class 1, minor diameter..... | Max ⁴ | . 8954 | . 9579 | 1. 0204 | 1. 0829 | 1. 1454 | 1. 2079 | 1. 2704 |
| | Classes 2, 3, and 4, minor diameter..... | Max ⁴ | . 8978 | . 9603 | 1. 0228 | 1. 0853 | 1. 1478 | 1. 2103 |
| Class 1, loose fit, pitch diameter..... | Max.... | . 9435 | 1. 0060 | 1. 0685 | 1. 1310 | 1. 1935 | 1. 2560 | 1. 3185 |
| | Min.... | . 9356 | . 9981 | 1. 0606 | 1. 1231 | 1. 1856 | 1. 2481 | 1. 3106 |
| | Tol.... | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 |
| Class 2, free fit, pitch diameter..... | Max.... | . 9459 | 1. 0084 | 1. 0709 | 1. 1334 | 1. 1959 | 1. 2584 | 1. 3 09 |
| | Min.... | . 9403 | 1. 0028 | 1. 0653 | 1. 1278 | 1. 1903 | 1. 2528 | 1. 3153 |
| | Tol.... | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 |
| Class 3, medium fit, pitch diameter..... | Max.... | . 9459 | 1. 0084 | 1. 0709 | 1. 1334 | 1. 1959 | 1. 2584 | 1. 3209 |
| | Min.... | . 9419 | 1. 0044 | 1. 0669 | 1. 1294 | 1. 1919 | 1. 2544 | 1. 3169 |
| | Tol.... | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 |
| Class 4, close fit, pitch diameter..... | Max.... | . 9464 | 1. 0089 | 1. 0714 | 1. 1339 | 1. 1964 | 1. 2589 | 1. 3214 |
| | Min.... | . 9444 | 1. 0069 | 1. 0694 | 1. 1319 | 1. 1944 | 1. 2569 | 1. 3194 |
| | Tol.... | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 |
| NUTS AND TAPPED HOLES | | | | | | | | |
| Classes 1, 2, 3, and 4, major diameter..... | Min. ⁵ | 1. 0000 | 1. 0625 | 1. 1250 | 1. 1875 | 1. 2500 | 1. 3125 | 1. 3750 |
| Classes 1, 2, 3, and 4, minor diameter..... | Max.... | . 9188 | . 9813 | 1. 0438 | 1. 1063 | 1. 1688 | 1. 2313 | 1. 2938 |
| | Min.... | . 9098 | . 9723 | 1. 0348 | 1. 0973 | 1. 1598 | 1. 2223 | 1. 2848 |
| | Tol.... | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 |
| Classes 1, 2, 3, and 4, pitch diameter..... | Min.... | . 9459 | 1. 0084 | 1. 0709 | 1. 1334 | 1. 1959 | 1. 2584 | 1. 3209 |
| Class 1, pitch diameter..... | Max.... | . 9538 | 1. 0163 | 1. 0788 | 1. 1413 | 1. 2038 | 1. 2663 | 1. 3288 |
| | Tol.... | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 | . 0079 |
| Class 2, pitch diameter..... | Max.... | . 9515 | 1. 0140 | 1. 0765 | 1. 1390 | 1. 2015 | 1. 2640 | 1. 3265 |
| | Tol.... | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 | . 0056 |
| Class 3, pitch diameter..... | Max.... | . 9499 | 1. 0124 | 1. 0749 | 1. 1374 | 1. 1999 | 1. 2624 | 1. 3249 |
| | Tol.... | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 | . 0040 |
| Class 4, pitch diameter..... | Max.... | . 9479 | 1. 0104 | 1. 0729 | 1. 1354 | 1. 1979 | 1. 2604 | 1. 3229 |
| | Tol.... | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 | . 0020 |

Footnotes at end of table.

TABLE 88.—Limiting dimensions and tolerances, classes 1, 2, 3, and 4 fits, American National 12-pitch thread series—Continued

| Dimensions and tolerances ¹ | Size, (inches) | | | | | | | |
|---|----------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------|
| | 1½ ³ | 1¾ | 2 | 2¼ | 2½ | 2¾ | 3 | |
| 1 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | |
| BOLTS AND SCREWS | | | | | | | | |
| Class 1, major diameter----- | <i>Inches</i> | <i>Inches</i> | <i>Inches</i> | <i>Inches</i> | <i>Inches</i> | <i>Inches</i> | <i>Inches</i> | |
| | Max.. | 1. 4976 | 1. 7476 | 1. 9976 | 2. 2476 | 2. 4976 | 2. 7476 | 2. 9976 |
| | Min.. | 1. 4818 | 1. 7318 | 1. 9818 | 2. 2318 | 2. 4818 | 2. 7318 | 2. 9818 |
| Classes 2, 3, and 4, major diameter----- | Tol.. | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 | . 0158 |
| | Max.. | 1. 5000 | 1. 7500 | 2. 0000 | 2. 2500 | 2. 5000 | 2. 7500 | 3. 0000 |
| | Min.. | 1. 4888 | 1. 7388 | 1. 9888 | 2. 2388 | 2. 4888 | 2. 7388 | 2. 9888 |
| Class 1, minor diameter----- | Tol.. | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 | . 0112 |
| | Max. ⁴ .. | 1. 3954 | 1. 6454 | 1. 8954 | 2. 1454 | 2. 3954 | 2. 6454 | 2. 8954 |
| | Max. ⁴ .. | 1. 3978 | 1. 6478 | 1. 8978 | 2. 1478 | 2. 3978 | 2. 6478 | 2. 8978 |
| Class 1, loose fit, pitch diameter----- | Max.. | 1. 4435 | 1. 6935 | 1. 9435 | 2. 1935 | 2. 4435 | 2. 6935 | 2. 9435 |
| | Min.. | 1. 4356 | 1. 6829 | 1. 9329 | 2. 1823 | 2. 4323 | 2. 6823 | 2. 9323 |
| | Tol.. | . 0079 | . 0106 | . 0106 | . 0112 | . 0112 | . 0112 | . 0112 |
| Class 2, free fit, pitch diameter----- | Max.. | 1. 4459 | 1. 6959 | 1. 9459 | 2. 1959 | 2. 4459 | 2. 6959 | 2. 9459 |
| | Min.. | 1. 4403 | 1. 6882 | 1. 9382 | 2. 1876 | 2. 4376 | 2. 6876 | 2. 9376 |
| | Tol.. | . 0056 | . 0077 | . 0077 | . 0083 | . 0083 | . 0083 | . 0083 |
| Class 3, medium fit, pitch diameter----- | Max.. | 1. 4459 | 1. 6959 | 1. 9459 | 2. 1959 | 2. 4459 | 2. 6959 | 2. 9459 |
| | Min.. | 1. 4419 | 1. 6896 | 1. 9396 | 2. 1890 | 2. 4390 | 2. 6890 | 2. 9390 |
| | Tol.. | . 0040 | . 0063 | . 0063 | . 0069 | . 0069 | . 0069 | . 0069 |
| Class 4, close fit, pitch diameter----- | Max.. | 1. 4464 | 1. 6964 | 1. 9464 | 2. 1964 | 2. 4464 | 2. 6964 | 2. 9464 |
| | Min.. | 1. 4444 | 1. 6933 | 1. 9433 | 2. 1930 | 2. 4430 | 2. 6930 | 2. 9430 |
| | Tol.. | . 0020 | . 0031 | . 0031 | . 0034 | . 0034 | . 0034 | . 0034 |
| NUTS AND TAPPED HOLES | | | | | | | | |
| Classes 1, 2, 3, and 4, major diameter Min. ⁵ .. | 1. 5000 | 1. 7500 | 2. 0000 | 2. 2500 | 2. 5000 | 2. 7500 | 3. 0000 | |
| Classes 1, 2, 3, and 4, minor diameter----- | Max.. | 1. 4188 | 1. 6688 | 1. 9188 | 2. 1688 | 2. 4188 | 2. 6688 | 2. 9188 |
| | Min.. | 1. 4098 | 1. 6598 | 1. 9098 | 2. 1598 | 2. 4098 | 2. 6598 | 2. 9098 |
| | Tol.. | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 |
| Classes 1, 2, 3, and 4, pitch diameter Min.. | 1. 4459 | 1. 6959 | 1. 9459 | 2. 1959 | 2. 4459 | 2. 6959 | 2. 9459 | |
| Class 1, pitch diameter----- | Max.. | 1. 4538 | 1. 7065 | 1. 9565 | 2. 2071 | 2. 4571 | 2. 7071 | 2. 9571 |
| | Tol.. | . 0079 | . 0106 | . 0106 | . 0112 | . 0112 | . 0112 | . 0112 |
| Class 2, pitch diameter----- | Max.. | 1. 4515 | 1. 7036 | 1. 9536 | 2. 2042 | 2. 4542 | 2. 7042 | 2. 9542 |
| | Tol.. | . 0056 | . 0077 | . 0077 | . 0083 | . 0083 | . 0083 | . 0083 |
| Class 3, pitch diameter----- | Max.. | 1. 4499 | 1. 7022 | 1. 9522 | 2. 2028 | 2. 4528 | 2. 7028 | 2. 9528 |
| | Tol.. | . 0040 | . 0063 | . 0063 | . 0069 | . 0069 | . 0069 | . 0069 |
| Class 4, pitch diameter----- | Max.. | 1. 4479 | 1. 6990 | 1. 9490 | 2. 1993 | 2. 4493 | 2. 6993 | 2. 9493 |
| | Tol.. | . 0020 | . 0031 | . 0031 | . 0034 | . 0034 | . 0034 | . 0034 |

¹ Tolerances are based on a length of engagement of 1 inch.

² Standard size screw and nut of the American national coarse-thread series.

³ Standard size screw and nut of the American national fine-thread series.

⁴ Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worn tool arc with a center line through crest and root. The minimum minor diameter of the screw shall be that corresponding to a flat at the minor diameter of the minimum screw equal to $\frac{1}{8} \times p$, and may be determined by subtracting 0.0541 inch from the minimum pitch diameter of the screw.

⁵ Dimensions for the minimum major diameter of the nut correspond to the basic flat, $(\frac{1}{4} \times p)$, and the profile at the major diameter produced by a worn tool must not fall below the basic outline. The maximum major diameter of the nut shall be that corresponding to a flat at the major diameter of the maximum nut equal to $\frac{1}{4} \times p$, and may be determined by adding 0.0662 inch to the maximum pitch diameter of the nut.

II. SCREW THREADS OF SPECIAL DIAMETERS, PITCHES, AND LENGTHS OF ENGAGEMENT

For threaded parts such as hub and radiator caps in the automotive industry, threaded collars on machine tools, etc., where the diameters are larger, the pitches finer, and the lengths of engagement shorter than for bolt and nut practice Tables 27, 28, 29, 30, and 31 are arranged herein, and are intended to cover all practical combinations of diameter, pitch, length of engagement, and class of fit. The use of these tables instead of the application of formulas to determine limiting dimensions of a special thread facilitates placing dimensions on drawings. Also, in cases of special threads of the same diameter, pitch, and class of fit, but slightly different lengths of engagement, the threads may be gaged by a single set of gages, as identical pitch diameter tolerances will be applied.

RULES FOR USE OF TABLES.—For consistent application of these pitch-diameter tolerance tables to all cases, adherence to the following rules relative to the use of the tables is necessary:

1. All thread dimensions of threads of special diameters, pitches, and lengths of engagement, except pitch diameter tolerances, are derived from Table 27. Pitch diameter tolerances are taken from Tables 28, 29, 30, and 31, depending upon the class of fit required.

Tolerances on pitch diameter corresponding to major diameters between those for which values are given in the tables shall be those of the next larger diameter.

2. Tolerances on pitch diameter for pitches between those for which values are given in the tables shall be those of the next coarser pitch, except that for screws having 80, 72, 44, 13, 11, 9, 7, 5, or 4½ threads per inch, lengths of engagement of one and one-half diameters or less, and diameters less than the standard diameters for the respective pitches as given in Section III² for standard sizes and pitches, the tolerances given in Section III shall be used

3. Tolerances on pitch diameter for pitches coarser than 4 threads per inch shall be the same as those for 4 threads per inch.

4. Tolerances on pitch diameter when the length of engagement is ½, or 1½, inches for 12 threads per inch and finer, or 1, or 3, inches for pitches coarser than 12 threads per inch, shall correspond to the interval of which these are the upper limits.

5. Tolerances on pitch diameter for lengths of engagement greater than those for which values are given shall be the maximum values listed for the pitch concerned.

Example: ¾ inch, 16-thread, class 1, with allowance on screw, one-half inch length of engagement:

From Table 28:

Pitch diameter tolerance.....=0.0095

Also from Table 27, for the screw:

Maximum major diameter=3.2500-0.0018=3.2482

Minimum major diameter =3.2482- .0126=3.2356

Maximum minor diameter=3.2500- .0785=3.1715

Maximum pitch diameter =3.2500- .0424=3.2076

Minimum pitch diameter =3.2076- .0095=3.1981

And for the nut:

Minimum major diameter.....=3.2500

Minimum minor diameter =3.2500- .0677=3.1823

Maximum minor diameter=3.1823+ .0068=3.1891

Minimum pitch diameter =3.2500- .0406=3.2094

Maximum pitch diameter =3.2094+ .0095=3.2189

² Of the 1928 report.

TABLE 27.—Thread dimensions of special screw threads, classes 1, 2, 3, and 4 fls

| Threads per inch | SCREW SIZES | | | | NUT SIZES | | | |
|------------------|--|-----------------|-----------------|-----------------|---|-------------|-------------------------|-------------------------|
| | Major diameter | | | | Minor diameter | | | |
| | Maximum | | Tolerance | | Minimum | | Tolerance | |
| | Class 1 | Classes 2, 3, 4 | Class 1 | Classes 2, 3, 4 | Minimum | Tolerance | Minor diameter, minimum | Major diameter, minimum |
| | To obtain maximum dimensions for major, pitch, and minor diameters, subtract the values in the "maximum" columns from the basic major diameter. Apply tolerances minus. See Tables 28, 29, 30, and 31 for pitch diameter tolerances. | | | | To obtain minimum dimensions for minor, pitch, and major diameters, subtract the values in the "minimum" columns from the basic major diameter. Apply tolerances plus. See Tables 28, 29, 30, and 31 for pitch diameter tolerances. | | | |
| | Pitch diameter, maximum | | | | Pitch diameter, maximum | | | |
| | Class 1 | | Classes 2, 3, 4 | | Class 1 | | Classes 2, 3, 4 | |
| | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> |
| 64 | 0.0007 | 0.0038 | 0.0108 | 0.0101 | 0.0199 | 0.0192 | 0.0017 | 0.0000 |
| 56 | 0.0008 | 0.0040 | 0.0124 | 0.0116 | 0.0227 | 0.0219 | 0.0019 | 0.0000 |
| 48 | 0.0009 | 0.0044 | 0.0144 | 0.0135 | 0.0265 | 0.0256 | 0.0023 | 0.0000 |
| 40 | 0.0010 | 0.0048 | 0.0172 | 0.0162 | 0.0317 | 0.0307 | 0.0027 | 0.0000 |
| 36 | 0.0011 | 0.0050 | 0.0191 | 0.0180 | 0.0352 | 0.0341 | 0.0030 | 0.0000 |
| 32 | 0.0011 | 0.0054 | 0.0214 | 0.0203 | 0.0394 | 0.0383 | 0.0034 | 0.0000 |
| 28 | 0.0012 | 0.0062 | 0.0244 | 0.0232 | 0.0450 | 0.0438 | 0.0039 | 0.0000 |
| 24 | 0.0013 | 0.0066 | 0.0284 | 0.0271 | 0.0524 | 0.0511 | 0.0045 | 0.0000 |
| 20 | 0.0015 | 0.0072 | 0.0340 | 0.0325 | 0.0628 | 0.0613 | 0.0054 | 0.0000 |
| 18 | 0.0016 | 0.0082 | 0.0377 | 0.0361 | 0.0698 | 0.0682 | 0.0060 | 0.0000 |
| 16 | 0.0018 | 0.0090 | 0.0424 | 0.0406 | 0.0785 | 0.0767 | 0.0068 | 0.0000 |
| 14 | 0.0021 | 0.0098 | 0.0485 | 0.0464 | 0.0897 | 0.0876 | 0.0077 | 0.0000 |
| 12 | 0.0024 | 0.0112 | 0.0565 | 0.0541 | 0.1046 | 0.1022 | 0.0090 | 0.0000 |
| 10 | 0.0028 | 0.0128 | 0.0678 | 0.0650 | 1.255 | 1.227 | 0.0109 | 0.0000 |
| 8 | 0.0034 | 0.0152 | 0.0846 | 0.0812 | 1.568 | 1.534 | 0.0135 | 0.0000 |
| 6 | 0.0044 | 0.0202 | 0.1127 | 0.1083 | 2.089 | 2.045 | 0.0180 | 0.0000 |
| 4 | 0.0064 | 0.0280 | 0.1688 | 0.1624 | 3.131 | 3.067 | 0.0270 | 0.0000 |

¹ Dimensions given for the maximum minor diameter of the screw are figured to the intersection of the worm tool arc with a center line through crest and root. The minimum minor diameter of the screw shall be that corresponding to a flat at the minor diameter of the minimum screw equal to $\frac{1}{4} \times p$, and may be determined by subtracting the basic thread depth, h (or $0.6495p$), from the minimum pitch diameter of the screw.

² Dimensions for the minimum major diameter of the nut correspond to the basic flat ($\frac{1}{4} \times p$), and the profile at the major diameter produced by a worn tool must not fall below the basic outline. The maximum major diameter of the nut shall be that corresponding to a flat at the major diameter of the maximum nut equal to $\frac{1}{4} \times p$, and may be determined by adding $1\frac{1}{4} \times h$ (or $0.7939p$) to the maximum pitch diameter of the nut.

TABLE 28.—Pitch diameter tolerances for special screw threads, class 1, loose fit

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|---------------------|-----------|---------------------|---------------------|---------------------|---------------------|
| | From— | To and including— | 1/16 inch | 1/8 inch | 3/16 inch | 1/4 inch | 5/16 inch | 3/8 inch | 1/2 inch |
| | Inches | Inches | Inch | Inch | Inch | Inch | Inch | Inch | Inch |
| 64 | ----- | 1/2 | 0. 0026 | 0. 0026 | 0. 0034 | 0. 0038 | 0. 0042 | 0. 0044 | 0. 0047 |
| 56 | { | 1/2 | . 0028 | . 0028 | . 0034 | . 0038 | . 0044 | . 0046 | . 0049 |
| | | 1 1/2 | . 0052 | . 0054 | . 0055 | . 0056 | . 0056 | . 0056 | . 0056 |
| 48 | { | 1/2 | . 0031 | . 0031 | . 0034 | . 0038 | . 0046 | . 0048 | . 0051 |
| | | 1 1/2 | . 0054 | . 0056 | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 |
| 40 | { | 1/2 | . 0034 | ¹ . 0034 | . 0034 | . 0038 | . 0046 | . 0051 | . 0054 |
| | | 1 1/2 | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 |
| 36 | { | 1/2 | ----- | . 0036 | . 0036 | . 0038 | . 0046 | . 0051 | . 0056 |
| | | 1 1/2 | ----- | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 |
| 32 | { | 1/2 | ----- | . 0038 | . 0038 | . 0038 | . 0046 | . 0051 | . 0057 |
| | | 1 1/2 | ----- | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 |
| 28 | { | 1/2 | ----- | ----- | . 0043 | ² . 0043 | . 0046 | . 0051 | . 0057 |
| | | 1 1/2 | ----- | ----- | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 |
| 24 | { | 1/2 | ----- | ----- | . 0046 | . 0046 | ² . 0046 | . 0051 | . 0057 |
| | | 1 1/2 | ----- | ----- | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 |
| 20 | { | 1/2 | ----- | ----- | . 0051 | ¹ . 0051 | . 0051 | ² . 0051 | . 0057 |
| | | 1 1/2 | 3 | ----- | . 0057 | . 0057 | . 0057 | . 0057 | . 0057 |
| 18 | { | 1/2 | ----- | ----- | ----- | . 0057 | . 0057 | . 0057 | . 0057 |
| | | 1 1/2 | 3 | ----- | ----- | ----- | . 0102 | . 0104 | . 0106 |
| 16 | { | 1/2 | ----- | ----- | ----- | . 0063 | ¹ . 0063 | . 0063 | . 0063 |
| | | 1 1/2 | 3 | ----- | ----- | ----- | . 0063 | . 0063 | . 0063 |
| 14 | { | 1/2 | ----- | ----- | ----- | ----- | . 0070 | . 0070 | . 0070 |
| | | 1 1/2 | 3 | ----- | ----- | ----- | ----- | . 0111 | . 0113 |
| 12 | { | 1/2 | ----- | ----- | ----- | ----- | . 0075 | . 0077 | . 0079 |
| | | 1 1/2 | 3 | ----- | ----- | ----- | ----- | . 0079 | . 0079 |
| 10 | { | 1 | ----- | ----- | ----- | ----- | ----- | . 0087 | ¹ . 0092 |
| | | 3 | 6 | ----- | ----- | ----- | ----- | . 0117 | . 0120 |
| 8 | { | 1 | ----- | ----- | ----- | ----- | ----- | . 0167 | . 0171 |
| | | 3 | 6 | ----- | ----- | ----- | ----- | . 0095 | . 0098 |
| 6 | { | 1 | ----- | ----- | ----- | ----- | ----- | . 0125 | . 0128 |
| | | 3 | 6 | ----- | ----- | ----- | ----- | . 0175 | . 0178 |
| | { | 1 | ----- | ----- | ----- | ----- | ----- | ----- | . 0109 |
| | | 3 | 6 | ----- | ----- | ----- | ----- | ----- | . 0139 |
| | | | ----- | ----- | ----- | ----- | ----- | ----- | . 0189 |

¹ Standard size of the American National coarse-thread series.

² Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 28.—Pitch diameter tolerances for special screw threads, class 1, loose fit—Continued

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|-----------|----------|----------|----------|----------|----------|
| | From— | To and including— | 1 inch | 1½ inches | 2 inches | 3 inches | 4 inches | 6 inches | 8 inches |
| | Inches | Inches | Inch | Inch | Inch | Inch | Inch | Inch | Inch |
| 64 | | ½ | 0.0050 | 0.0052 | | | | | |
| 56 | { | ½ | .0052 | .0056 | | | | | |
| | | 1½ | .0056 | .0056 | | | | | |
| 48 | { | ½ | .0054 | .0058 | 0.0062 | | | | |
| | | 1½ | .0062 | .0062 | .0062 | | | | |
| 40 | { | ½ | .0057 | .0061 | .0065 | | | | |
| | | 1½ | .0068 | .0068 | .0068 | | | | |
| 36 | { | ½ | .0058 | .0063 | .0067 | 0.0072 | | | |
| | | 1½ | .0070 | .0072 | .0072 | .0072 | | | |
| 32 | { | ½ | .0060 | .0065 | .0069 | .0075 | | | |
| | | 1½ | .0070 | .0076 | .0076 | .0076 | | | |
| 28 | { | ½ | .0063 | .0067 | .0071 | .0077 | 0.0083 | | |
| | | 1½ | .0070 | .0079 | .0086 | .0086 | .0086 | | |
| 24 | { | ½ | .0066 | .0070 | .0074 | .0080 | .0086 | | |
| | | 1½ | .0070 | .0079 | .0089 | .0092 | .0092 | | |
| 20 | { | ½ | .0070 | .0074 | .0078 | .0084 | .0090 | 0.0099 | |
| | | 1½ | .0070 | .0079 | .0093 | .0099 | .0102 | .0102 | |
| | | 3 | .0102 | .0102 | .0102 | .0102 | .0102 | .0102 | |
| 18 | { | ½ | .0070 | .0077 | .0080 | .0087 | .0092 | .0101 | 0.0109 |
| | | 1½ | .0070 | .0079 | .0095 | .0102 | .0107 | .0114 | .0114 |
| | | 3 | .0112 | .0114 | .0114 | .0114 | .0114 | .0114 | .0114 |
| 16 | { | ½ | .0070 | .0079 | .0083 | .0090 | .0095 | .0104 | .0112 |
| | | 1½ | .0070 | .0079 | .0098 | .0105 | .0110 | .0119 | .0126 |
| | | 3 | .0115 | .0120 | .0123 | .0126 | .0126 | .0126 | .0126 |
| 14 | { | ½ | .0070 | .0079 | .0087 | .0093 | .0099 | .0108 | .0115 |
| | | 1½ | .0070 | .0079 | .0102 | .0108 | .0114 | .0123 | .0130 |
| | | 3 | .0119 | .0123 | .0127 | .0133 | .0139 | .0140 | .0140 |
| 12 | { | ½ | .0079 | .0079 | .0091 | .0097 | .0103 | .0112 | .0119 |
| | | 1½ | .0079 | .0079 | .0106 | .0112 | .0118 | .0127 | .0134 |
| | | 3 | .0123 | .0127 | .0131 | .0137 | .0143 | .0152 | .0158 |
| 10 | { | 1 | .0093 | .0098 | .0102 | .0108 | .0113 | .0122 | .0130 |
| | | 3 | .0123 | .0128 | .0132 | .0138 | .0143 | .0152 | .0160 |
| | | 6 | .0173 | .0178 | .0181 | .0184 | .0184 | .0184 | .0184 |
| 8 | { | 1 | .0111 | .0111 | .0111 | .0115 | .0121 | .0130 | .0137 |
| | | 3 | .0131 | .0135 | .0139 | .0145 | .0151 | .0160 | .0167 |
| | | 6 | .0181 | .0185 | .0189 | .0195 | .0201 | .0210 | .0217 |
| 6 | { | 1 | .0112 | .0116 | .0120 | .0126 | .0132 | .0141 | .0148 |
| | | 3 | .0142 | .0145 | .0150 | .0156 | .0162 | .0171 | .0178 |
| | | 6 | .0192 | .0196 | .0200 | .0206 | .0212 | .0221 | .0228 |
| 4 | { | 1 | .0130 | .0134 | .0138 | .0145 | .0150 | .0159 | .0167 |
| | | 3 | .0160 | .0164 | .0168 | .0204 | .0204 | .0204 | .0204 |
| | | 6 | .0210 | .0215 | .0218 | .0225 | .0230 | .0239 | .0247 |

¹ Standard size of the American National coarse-thread series.

² Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 28.—Pitch diameter tolerances for special screw threads, class 1, loose fit—Continued

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|-----------|-----------|-----------|-----------|-----------|-----------|
| | From— | To and including— | 10 inches | 12 inches | 14 inches | 16 inches | 18 inches | 20 inches | 24 inches |
| | Inches | Inches | Inch | Inch | Inch | Inch | Inch | Inch | Inch |
| 18 | 1/2 | 3/2 | 0.0114 | | | | | | |
| | 1/2 | 1 1/2 | .0114 | | | | | | |
| | 1 1/2 | 3 | .0114 | | | | | | |
| 16 | 1/2 | 3/2 | .0118 | 0.0124 | | | | | |
| | 1/2 | 1 1/2 | .0126 | .0126 | | | | | |
| | 1 1/2 | 3 | .0126 | .0126 | | | | | |
| 14 | 1/2 | 3/2 | .0122 | .0128 | 0.0133 | 0.0138 | | | |
| | 1/2 | 1 1/2 | .0137 | .0140 | .0140 | .0140 | | | |
| | 1 1/2 | 3 | .0140 | .0140 | .0140 | .0140 | | | |
| 12 | 1/2 | 3/2 | .0126 | .0132 | .0138 | .0143 | 0.0148 | 0.0152 | |
| | 1/2 | 1 1/2 | .0141 | .0147 | .0153 | .0158 | .0158 | .0158 | |
| | 1 1/2 | 3 | .0158 | .0158 | .0158 | .0158 | .0158 | .0158 | |
| 10 | 1 | 3 | .0136 | .0142 | .0148 | .0153 | .0158 | .0163 | 0.0171 |
| | 1 | 3 | .0166 | .0172 | .0178 | .0183 | .0184 | .0184 | .0184 |
| | 3 | 6 | .0184 | .0184 | .0184 | .0184 | .0184 | .0184 | .0184 |
| 8 | 1 | 3 | .0144 | .0150 | .0156 | .0161 | .0166 | .0170 | .0179 |
| | 1 | 3 | .0174 | .0180 | .0186 | .0191 | .0196 | .0200 | .0209 |
| | 3 | 6 | .0222 | .0222 | .0222 | .0222 | .0222 | .0222 | .0222 |
| 6 | 1 | 3 | .0155 | .0161 | .0166 | .0172 | .0176 | .0181 | .0190 |
| | 1 | 3 | .0185 | .0191 | .0196 | .0202 | .0206 | .0211 | .0220 |
| | 3 | 6 | .0235 | .0241 | .0246 | .0252 | .0256 | .0261 | .0270 |
| 4 | 1 | 3 | .0173 | .0179 | .0185 | .0190 | .0195 | .0199 | .0208 |
| | 1 | 3 | .0204 | .0209 | .0215 | .0220 | .0225 | .0229 | .0238 |
| | 3 | 6 | .0253 | .0259 | .0265 | .0270 | .0275 | .0279 | .0288 |

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 29.—Pitch diameter tolerances for special screw threads, class 2, free fit

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|-------------------------------|-------------------------|-------------------------------|---|-------------------------------|---|
| | From— | To and including— | 1/16 inch | 1/8 inch | 3/16 inch | 1/4 inch | 5/16 inch | 3/8 inch | 1/2 inch |
| | Inches | Inches | Inch | Inch | Inch | Inch | Inch | Inch | Inch |
| 64 | ----- | 1/2 | 0. 0019 | 0. 0019 | 0. 0024 | 0. 0027 | 0. 0030 | 0. 0032 | 0. 0035 |
| 56 | {----- 1/2 | 1/2 1 1/2 | . 0020 . 0038 | . 0020 . 0040 | . 0024 . 0040 | . 0027 . 0040 | . 0031 . 0040 | . 0033 . 0040 | . 0036 . 0040 |
| 48 | {----- 1/2 | 1/2 1 1/2 | . 0022 . 0039 | . 0022 . 0041 | . 0024 . 0041 | . 0027 . 0041 | . 0032 . 0041 | . 0034 . 0041 | . 0037 . 0041 |
| 40 | {----- 1/2 | 1/2 1 1/2 | . 0024 . 0041 | ¹ . 0024 . 0041 | . 0024 . 0041 | . 0027 . 0041 | . 0033 . 0041 | . 0035 . 0041 | . 0038 . 0041 |
| 36 | {----- 1/2 | 1/2 1 1/2 | ----- ----- | . 0025 . 0041 | . 0025 . 0041 | . 0027 . 0041 | . 0033 . 0041 | . 0036 . 0041 | . 0039 . 0041 |
| 32 | {----- 1/2 | 1/2 1 1/2 | ----- ----- | . 0027 . 0041 | . 0027 . 0041 | . 0027 . 0041 | . 0033 . 0041 | . 0036 . 0041 | . 0040 . 0041 |
| 28 | {----- 1/2 | 1/2 1 1/2 | ----- ----- | ----- ----- | . 0031 . 0041 | ² . 0031 . 0041 | . 0033 . 0041 | . 0036 . 0041 | . 0041 . 0041 |
| 24 | {----- 1/2 | 1/2 1 1/2 | ----- ----- | ----- ----- | . 0033 . 0041 | . 0033 . 0041 | ² . 0033 . 0041 | . 0036 . 0041 | . 0041 . 0041 |
| 20 | {----- 1/2 | 1/2 1 1/2 | ----- ----- | ----- ----- | . 0036 . 0041 | ¹ . 0036 . 0041 | . 0036 . 0041 | ² . 0036 . 0041 | . 0041 . 0041 |
| 18 | {----- 1 1/2 | 1/2 3 | ----- ----- | ----- ----- | ----- ----- | . 0039 . 0041 . 0079 | . 0041 . 0041 . 0081 | . 0041 . 0041 . 0082 | . 0041 . 0041 . 0082 |
| 16 | {----- 1 1/2 | 1/2 3 | ----- ----- | ----- ----- | ----- ----- | . 0040 . 0045 . 0080 | ¹ . 0045 . 0045 . 0082 | . 0045 . 0045 . 0084 | . 0045 ² . 0045 . 0087 |
| 14 | {----- 1 1/2 | 1/2 3 | ----- ----- | ----- ----- | ----- ----- | ----- ----- | . 0045 . 0049 . 0084 | . 0048 . 0049 . 0086 | . 0049 . 0049 . 0089 |
| 12 | {----- 1 1/2 | 1/2 3 | ----- ----- | ----- ----- | ----- ----- | ----- ----- | . 0046 . 0056 . 0086 | . 0048 . 0056 . 0088 | . 0051 . 0056 . 0091 |
| 10 | {----- 3 | 1 3 6 | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | . 0056 . 0088 . 0128 | ¹ . 0064 . 0091 . 0128 |
| 8 | {----- 3 | 1 3 6 | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | . 0060 . 0090 . 0140 | . 0064 . 0093 . 0143 |
| 6 | {----- 3 | 1 3 6 | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | ----- ----- ----- | . 0068 . 0098 . 0148 |

¹ Standard size of the American National coarse-thread series.

² Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 29.—Pitch diameter tolerances for special screw threads, class 2, free fit—Continued

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|-------------|-------------|-------------|-------------|-------------|-------------|
| | From— | To and including— | 1 inch | 1½ inches | 2 inches | 3 inches | 4 inches | 6 inches | 8 inches |
| | <i>Inches</i> | <i>Inches</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> |
| 64 | | ½ | 0. 0038 | | | | | | |
| 56 | { | ½ | . 0038 | 0. 0040 | | | | | |
| | | 1½ | . 0040 | . 0040 | | | | | |
| 48 | { | ½ | . 0039 | . 0044 | | | | | |
| | | 1½ | . 0044 | . 0044 | | | | | |
| 40 | { | ½ | . 0041 | . 0045 | 0. 0048 | | | | |
| | | 1½ | . 0048 | . 0048 | . 0048 | | | | |
| 36 | { | ½ | . 0042 | . 0046 | . 0050 | | | | |
| | | 1½ | . 0049 | . 0050 | . 0050 | | | | |
| 32 | { | ½ | . 0043 | . 0047 | . 0051 | 0. 0054 | | | |
| | | 1½ | . 0049 | . 0054 | . 0054 | . 0054 | | | |
| 28 | { | ½ | . 0044 | . 0048 | . 0052 | . 0058 | 0. 0062 | | |
| | | 1½ | . 0049 | . 0056 | . 0062 | . 0062 | . 0062 | | |
| 24 | { | ½ | . 0045 | . 0050 | . 0054 | . 0060 | . 0065 | | |
| | | 1½ | . 0049 | . 0056 | . 0066 | . 0066 | . 0066 | | |
| 20 | { | ½ | . 0047 | . 0052 | . 0056 | . 0062 | . 0067 | 0. 0072 | |
| | | 1½ | . 0049 | . 0056 | . 0071 | . 0072 | . 0072 | . 0072 | |
| 18 | { | ½ | . 0049 | . 0053 | . 0057 | . 0063 | . 0069 | . 0078 | 0. 0082 |
| | | 1½ | . 0049 | . 0056 | . 0072 | . 0078 | . 0082 | . 0082 | . 0082 |
| | | 3 | . 0082 | . 0082 | . 0082 | . 0082 | . 0082 | . 0082 | . 0082 |
| 16 | { | ½ | . 0049 | . 0054 | . 0058 | . 0065 | . 0070 | . 0079 | . 0087 |
| | | 1½ | . 0049 | . 0056 | . 0073 | . 0080 | . 0085 | . 0090 | . 0090 |
| | | 3 | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 | . 0090 |
| 14 | { | ½ | . 0049 | . 0056 | . 0060 | . 0066 | . 0072 | . 0081 | . 0088 |
| | | 1½ | . 0049 | . 0056 | . 0075 | . 0081 | . 0087 | . 0096 | . 0098 |
| | | 3 | . 0092 | . 0096 | . 0098 | . 0098 | . 0098 | . 0098 | . 0098 |
| 12 | { | ½ | . 0054 | . 0056 | . 0062 | . 0068 | . 0074 | . 0083 | . 0090 |
| | | 1½ | . 0056 | . 0056 | . 0077 | . 0083 | . 0089 | . 0098 | . 0105 |
| | | 3 | . 0094 | . 0098 | . 0100 | . 0108 | . 0112 | . 0112 | . 0112 |
| 10 | { | 1 | . 0064 | . 0066 | . 0070 | . 0076 | . 0082 | . 0091 | . 0098 |
| | | 3 | . 0094 | . 0098 | . 0100 | . 0108 | . 0112 | . 0121 | . 0128 |
| | | 3 | . 0128 | . 0128 | . 0128 | . 0128 | . 0128 | . 0128 | . 0128 |
| 8 | { | 1 | . 0076 | . 0076 | . 0076 | . 0080 | . 0085 | . 0094 | . 0102 |
| | | 3 | . 0095 | . 0100 | . 0104 | . 0110 | . 0115 | . 0124 | . 0132 |
| | | 3 | . 0145 | . 0150 | . 0152 | . 0152 | . 0152 | . 0152 | . 0152 |
| 6 | { | 1 | . 0071 | . 0075 | . 0079 | . 0085 | . 0091 | . 0100 | . 0107 |
| | | 3 | . 0101 | . 0101 | . 0109 | . 0115 | . 0121 | . 0130 | . 0137 |
| | | 3 | . 0151 | . 0155 | . 0159 | . 0165 | . 0171 | . 0180 | . 0187 |
| 4 | { | 1 | . 0080 | . 0084 | . 0088 | . 0095 | . 0100 | . 0109 | . 0117 |
| | | 3 | . 0110 | . 0114 | . 0118 | . 0140 | . 0140 | . 0140 | . 0147 |
| | | 3 | . 0160 | . 0164 | . 0168 | . 0175 | . 0180 | . 0189 | . 0197 |

¹Standard size of the American National coarse-thread series.

²Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 29.—Pitch diameter tolerances for special screw threads, class 2, free fit—Continued

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|-------------|-------------|-------------|-------------|-------------|-------------|
| | From— | To and including— | 10 inches | 12 inches | 14 inches | 16 inches | 18 inches | 20 inches | 24 inches |
| | <i>Inches</i> | <i>Inches</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> |
| 16..... | 1/2 | 1/2 | 0.0090 | | | | | | |
| | 1/2 | 1 1/2 | .0090 | | | | | | |
| | 1 1/2 | 3 | .0090 | | | | | | |
| 14..... | 1/2 | 1/2 | .0095 | 0.0098 | | | | | |
| | 1/2 | 1 1/2 | .0098 | .0098 | | | | | |
| | 1 1/2 | 3 | .0098 | .0098 | | | | | |
| 12..... | 1/2 | 1/2 | .0097 | .0103 | 0.0109 | 0.0112 | | | |
| | 1/2 | 1 1/2 | .0112 | .0112 | .0112 | .0112 | | | |
| | 1 1/2 | 3 | .0112 | .0112 | .0112 | .0112 | | | |
| 10..... | 1 | 1 | .0105 | .0111 | .0116 | .0122 | 0.0126 | 0.0128 | |
| | 1 | 3 | .0128 | .0128 | .0128 | .0128 | .0128 | .0128 | |
| | 3 | 6 | .0128 | .0128 | .0128 | .0128 | .0128 | .0128 | |
| 8..... | 1 | 1 | .0109 | .0115 | .0120 | .0125 | .0130 | .0135 | 0.0143 |
| | 1 | 3 | .0139 | .0145 | .0150 | .0152 | .0152 | .0152 | .0152 |
| | 3 | 6 | .0152 | .0152 | .0152 | .0152 | .0152 | .0152 | .0152 |
| 6..... | 1 | 1 | .0114 | .0120 | .0126 | .0131 | .0136 | .0140 | .0149 |
| | 1 | 3 | .0144 | .0150 | .0156 | .0161 | .0166 | .0170 | .0179 |
| | 3 | 6 | .0194 | .0200 | .0202 | .0202 | .0202 | .0202 | .0202 |
| 4..... | 1 | 1 | .0123 | .0129 | .0135 | .0140 | .0145 | .0149 | .0158 |
| | 1 | 3 | .0153 | .0159 | .0165 | .0170 | .0175 | .0199 | .0188 |
| | 3 | 6 | .0203 | .0209 | .0215 | .0220 | .0225 | .0229 | .0238 |

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 30.—Pitch diameter tolerances for special screw threads, class 3, medium fit—Continued

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|--------------------|--------------------|--------------------|-------------|-------------|-------------|
| | From— | To and including— | 1 inch | 1½ inches | 2 inches | 3 inches | 4 inches | 6 inches | 8 inches |
| | <i>Inches</i> | <i>Inches</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> | <i>Inch</i> |
| 64 | ½ | ½ | 0.0031 | 0.0036 | 0.0038 | | | | |
| | ½ | 1½ | .0036 | .0038 | .0038 | | | | |
| 56 | ½ | ½ | .0032 | .0036 | .0040 | | | | |
| | ½ | 1½ | .0036 | .0040 | .0040 | | | | |
| 48 | ½ | ½ | .0032 | .0037 | .0041 | 0.0044 | | | |
| | ½ | 1½ | .0036 | .0040 | .0044 | .0044 | | | |
| 40 | ½ | ½ | .0033 | .0037 | .0041 | .0048 | | | |
| | ½ | 1½ | .0036 | .0040 | .0048 | .0048 | | | |
| 36 | ½ | ½ | .0033 | .0038 | .0042 | .0048 | 0.0050 | | |
| | ½ | 1½ | .0036 | .0040 | .0050 | .0050 | .0050 | | |
| 32 | ½ | ½ | .0034 | .0038 | .0042 | .0048 | .0054 | | |
| | ½ | 1½ | .0036 | .0040 | .0054 | .0054 | .0054 | | |
| 28 | ½ | ½ | .0034 | .0039 | .0043 | .0049 | .0054 | 0.0062 | |
| | ½ | 1½ | .0036 | .0040 | .0058 | .0062 | .0062 | .0062 | |
| 24 | ½ | ½ | .0035 | .0040 | .0044 | .0050 | .0055 | .0064 | |
| | ½ | 1½ | .0036 | .0040 | .0059 | .0065 | .0066 | .0066 | |
| 20 | ½ | ½ | .0036 | .0040 | .0045 | .0051 | .0056 | .0065 | 0.0072 |
| | 1½ | 1½ | .0036 | .0040 | .0060 | .0066 | .0071 | .0072 | .0072 |
| | 1½ | 3 | .0071 | .0071 | .0072 | .0072 | .0072 | .0072 | .0072 |
| 18 | ½ | ½ | .0036 | .0040 | .0045 | .0051 | .0057 | .0066 | .0073 |
| | 1½ | 1½ | .0036 | .0040 | .0060 | .0066 | .0072 | .0081 | .0082 |
| | 1½ | 3 | .0071 | .0071 | .0082 | .0082 | .0082 | .0082 | .0082 |
| 16 | ½ | ½ | .0036 | .0040 | .0046 | .0052 | .0058 | .0066 | .0074 |
| | 1½ | 1½ | .0036 | .0040 | .0061 | .0067 | .0073 | .0081 | .0089 |
| | 1½ | 3 | .0071 | .0071 | .0084 | .0090 | .0090 | .0090 | .0090 |
| 14 | ½ | ½ | .0036 | .0040 | .0047 | .0053 | .0058 | .0067 | .0075 |
| | 1½ | 1½ | ² .0036 | .0040 | .0062 | .0068 | .0073 | .0082 | .0090 |
| | 1½ | 3 | .0071 | .0071 | .0084 | .0092 | .0098 | .0098 | .0098 |
| 12 | ½ | ½ | .0040 | .0040 | .0048 | .0054 | .0059 | .0068 | .0076 |
| | 1½ | 1½ | .0040 | ² .0040 | .0063 | .0069 | .0074 | .0083 | .0091 |
| | 1½ | 3 | .0071 | .0071 | .0084 | .0092 | .0099 | .0108 | .0112 |
| 10 | 1 | 1 | .0046 | .0050 | .0054 | .0060 | .0066 | .0075 | .0082 |
| | 3 | 3 | .0071 | .0071 | ² .0084 | .0092 | .0099 | .0108 | .0112 |
| | 3 | 6 | .0126 | .0128 | .0128 | .0128 | .0128 | .0128 | .0128 |
| 8 | 1 | 1 | ¹ .0054 | .0054 | .0056 | .0062 | .0068 | .0077 | .0084 |
| | 3 | 3 | .0071 | .0071 | .0086 | ² .0092 | .0099 | .0108 | .0114 |
| | 3 | 6 | .0128 | .0132 | .0136 | .0142 | .0148 | .0152 | .0152 |
| 6 | 1 | 1 | .0054 | .0055 | .0059 | .0065 | .0070 | .0079 | .0087 |
| | 3 | 3 | .0071 | ¹ .0071 | .0089 | .0095 | .0100 | .0109 | .0117 |
| | 3 | 6 | .0130 | .0135 | .0139 | .0145 | .0150 | .0159 | .0167 |
| 4 | 1 | 1 | .0055 | .0059 | .0063 | .0070 | .0075 | .0084 | .0092 |
| | 3 | 3 | .0085 | .0089 | .0093 | ¹ .0097 | .0105 | .0114 | .0122 |
| | 3 | 6 | .0135 | .0139 | .0143 | .0150 | .0155 | .0164 | .0172 |

¹ Standard size of the American National coarse-thread series.² Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 30.—Pitch diameter tolerances for special screw threads, class 3, medium fit—Continued

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|-----------|-----------|-----------|-----------|-----------|-----------|
| | From— | To and including— | 10 inches | 12 inches | 14 inches | 16 inches | 18 inches | 20 inches | 24 inches |
| | Inches | Inches | Inch | Inch | Inch | Inch | Inch | Inch | Inch |
| 18 | 1/2 | 1 1/2 | 0. 0080 | | | | | | |
| | 1 1/2 | 3 | . 0082 | | | | | | |
| 16 | 1/2 | 1 1/2 | . 0081 | 0. 0087 | | | | | |
| | 1 1/2 | 3 | . 0090 | . 0090 | | | | | |
| 14 | 1/2 | 1 1/2 | . 0082 | . 0088 | 0. 0093 | 0. 0098 | | | |
| | 1 1/2 | 3 | . 0097 | . 0098 | . 0098 | . 0098 | | | |
| 12 | 1/2 | 1 1/2 | . 0083 | . 0089 | . 0094 | . 0099 | 0. 0104 | 0. 0109 | |
| | 1 1/2 | 3 | . 0098 | . 0104 | . 0109 | . 0112 | . 0112 | . 0112 | |
| 10 | 1 | 3 | . 0089 | . 0095 | . 0101 | . 0106 | . 0111 | . 0115 | 0. 0124 |
| | 3 | 6 | . 0119 | . 0125 | . 0128 | . 0128 | . 0128 | . 0128 | . 0128 |
| 8 | 1 | 3 | . 0091 | . 0097 | . 0102 | 0108 | . 0113 | . 0117 | . 0126 |
| | 3 | 6 | . 0121 | . 0127 | . 0132 | . 0138 | . 0143 | . 0147 | . 0152 |
| 6 | 1 | 3 | . 0094 | . 0100 | . 0105 | . 0110 | . 0115 | . 0120 | . 0128 |
| | 3 | 6 | . 0124 | . 0130 | . 0135 | . 0140 | . 0145 | . 0150 | . 0158 |
| 4 | 1 | 3 | . 0098 | . 0104 | . 0110 | . 0115 | . 0120 | . 0124 | . 0133 |
| | 3 | 6 | . 0128 | . 0134 | . 0140 | . 0145 | . 0150 | . 0154 | . 0163 |
| | | | . 0178 | . 0184 | . 0190 | . 0195 | . 0200 | . 0204 | . 0213 |

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a closer fit, shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 31.—Pitch diameter tolerances for special screw threads, class 4, close fit

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|--------------------|-----------|--------------------|--------------------|--------------------|--------------------|
| | From— | To and including— | 1/16 inch | 1/8 inch | 3/16 inch | 1/4 inch | 5/16 inch | 3/8 inch | 1/2 inch |
| | Inches | Inches | Inch | Inch | Inch | Inch | Inch | Inch | Inch |
| 64 | 1/2 | 1/2 | 0.0007 | 0.0007 | 0.0009 | 0.0010 | 0.0012 | 0.0013 | 0.0014 |
| | 1 1/2 | 1 1/2 | .0015 | .0015 | .0015 | .0015 | 0.0015 | .0015 | .0015 |
| 56 | 1/2 | 1/2 | .0007 | .0007 | .0009 | .0010 | .0012 | .0013 | .0014 |
| | 1 1/2 | 3 | .0015 | .0015 | .0015 | .0015 | .0015 | .0015 | .0015 |
| 48 | 1/2 | 1/2 | .0008 | .0008 | .0009 | .0010 | .0012 | .0013 | .0015 |
| | 1 1/2 | 3 | .0015 | .0015 | .0015 | .0015 | .0015 | .0015 | .0015 |
| 40 | 1/2 | 1/2 | .0009 | ¹ .0009 | .0009 | .0010 | .0012 | .0013 | .0015 |
| | 1 1/2 | 3 | .0015 | .0015 | .0015 | .0015 | .0015 | .0015 | .0015 |
| 36 | 1/2 | 1/2 | | .0009 | .0009 | .0010 | .0012 | .0013 | .0015 |
| | 1 1/2 | 3 | | .0015 | .0015 | .0015 | .0015 | .0015 | .0015 |
| 32 | 1/2 | 1/2 | | .0010 | .0010 | .0010 | .0012 | .0013 | .0015 |
| | 1 1/2 | 3 | | .0015 | .0015 | .0015 | .0015 | .0015 | .0015 |
| 28 | 1/2 | 1/2 | | | .0011 | ² .0011 | .0012 | .0013 | .0015 |
| | 1 1/2 | 3 | | | .0015 | .0015 | .0015 | .0015 | .0015 |
| 24 | 1/2 | 1/2 | | | .0012 | .0012 | ² .0012 | .0013 | .0015 |
| | 1 1/2 | 3 | | | .0015 | .0015 | .0015 | .0015 | .0015 |
| 20 | 1/2 | 1/2 | | | .0012 | ¹ .0013 | .0013 | ² .0013 | .0015 |
| | 1 1/2 | 3 | | | .0015 | .0015 | .0015 | .0015 | .0015 |
| 18 | 1/2 | 1/2 | | | | .0013 | .0015 | .0015 | .0015 |
| | 1 1/2 | 3 | | | | .0015 | .0015 | .0015 | .0015 |
| 16 | 1/2 | 1/2 | | | | .0014 | ¹ .0016 | .0016 | .0016 |
| | 1 1/2 | 3 | | | | .0016 | .0016 | .0016 | ² .0016 |
| 14 | 1/2 | 1/2 | | | | | .0016 | .0018 | .0018 |
| | 1 1/2 | 3 | | | | | .0018 | .0018 | .0018 |
| 12 | 1/2 | 1/2 | | | | | .0016 | .0018 | .0020 |
| | 1 1/2 | 3 | | | | | .0020 | .0020 | .0020 |
| 10 | 1 | 3 | | | | | | .0020 | ¹ .0023 |
| | 3 | 6 | | | | | | .0036 | .0036 |
| 8 | 1 | 3 | | | | | | .0021 | .0023 |
| | 3 | 6 | | | | | | .0036 | .0036 |
| 6 | 1 | 3 | | | | | | | .0024 |
| | 3 | 6 | | | | | | | .0036 |

¹ Standard size of the American National coarse-thread series.² Standard size of the American National fine-thread series.

TABLE 31.—Pitch diameter tolerances for special screw threads, class 4, close fit—Continued

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|-----------|----------|----------|----------|----------|----------|
| | From— | To and including— | 1 inch | 1½ inches | 2 inches | 3 inches | 4 inches | 6 inches | 8 inches |
| | Inches | Inches | Inch | Inch | Inch | Inch | Inch | Inch | Inch |
| 64 | ½ | ½ | 0.0016 | 0.0018 | 0.0020 | 0.0023 | 0.0026 | 0.0030 | 0.0034 |
| | 1½ | 3 | .0018 | .0020 | .0027 | .0030 | .0033 | .0038 | .0038 |
| 56 | ½ | ½ | .0016 | .0018 | .0020 | .0023 | .0026 | .0030 | .0034 |
| | 1½ | 3 | .0018 | .0020 | .0027 | .0031 | .0033 | .0038 | .0040 |
| 48 | ½ | ½ | .0016 | .0018 | .0020 | .0023 | .0026 | .0031 | .0034 |
| | 1½ | 3 | .0018 | .0020 | .0028 | .0031 | .0034 | .0038 | .0042 |
| 40 | ½ | ½ | .0016 | .0018 | .0021 | .0024 | .0027 | .0031 | .0035 |
| | 1½ | 3 | .0018 | .0020 | .0028 | .0031 | .0034 | .0038 | .0042 |
| 36 | ½ | ½ | .0017 | .0019 | .0021 | .0024 | .0027 | .0031 | .0035 |
| | 1½ | 3 | .0018 | .0020 | .0028 | .0031 | .0034 | .0039 | .0042 |
| 32 | ½ | ½ | .0017 | .0019 | .0021 | .0024 | .0027 | .0031 | .0035 |
| | 1½ | 3 | .0018 | .0020 | .0029 | .0032 | .0034 | .0039 | .0043 |
| 28 | ½ | ½ | .0017 | .0019 | .0021 | .0024 | .0027 | .0032 | .0036 |
| | 1½ | 3 | .0018 | .0020 | .0029 | .0032 | .0035 | .0039 | .0043 |
| 24 | ½ | ½ | .0018 | .0020 | .0022 | .0025 | .0028 | .0032 | .0036 |
| | 1½ | 3 | .0018 | .0020 | .0029 | .0032 | .0035 | .0040 | .0043 |
| 20 | ½ | ½ | .0018 | .0020 | .0022 | .0025 | .0028 | .0033 | .0036 |
| | 1½ | 3 | .0018 | .0020 | .0030 | .0033 | .0036 | .0040 | .0044 |
| 18 | ½ | ½ | .0018 | .0020 | .0023 | .0026 | .0028 | .0033 | .0037 |
| | 1½ | 3 | .0018 | .0020 | .0030 | .0033 | .0036 | .0040 | .0044 |
| 16 | ½ | ½ | .0018 | .0020 | .0023 | .0026 | .0029 | .0033 | .0037 |
| | 1½ | 3 | .0018 | .0020 | .0030 | .0033 | .0036 | .0041 | .0044 |
| 14 | ½ | ½ | .0018 | .0020 | .0023 | .0026 | .0029 | .0034 | .0038 |
| | 1½ | 3 | .0018 | .0020 | .0031 | .0034 | .0037 | .0041 | .0045 |
| 12 | ½ | ½ | .0020 | .0020 | .0024 | .0027 | .0030 | .0034 | .0038 |
| | 1½ | 3 | .0020 | .0020 | .0031 | .0034 | .0037 | .0042 | .0046 |
| 10 | 1 | 3 | .0023 | .0023 | .0027 | .0030 | .0033 | .0037 | .0041 |
| | 3 | 6 | .0036 | .0036 | .0042 | .0046 | .0050 | .0054 | .0058 |
| 8 | 1 | 3 | .0027 | .0027 | .0028 | .0031 | .0034 | .0038 | .0042 |
| | 3 | 6 | .0036 | .0036 | .0043 | .0046 | .0050 | .0054 | .0058 |
| 6 | 1 | 3 | .0027 | .0027 | .0029 | .0032 | .0035 | .0040 | .0043 |
| | 3 | 6 | .0036 | .0036 | .0044 | .0047 | .0050 | .0055 | .0058 |
| 4 | 1 | 3 | .0028 | .0030 | .0032 | .0035 | .0038 | .0042 | .0046 |
| | 3 | 6 | .0043 | .0045 | .0047 | .0048 | .0053 | .0057 | .0061 |

¹ Standard size of the American National coarse-thread series.

² Standard size of the American National fine-thread series.

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a shorter length of engagement, coarser pitch, or smaller diameter.

TABLE 31.—Pitch diameter tolerances for special screw threads, class 4, close fit—Continued

| Threads per inch | Lengths of engagement | | Pitch diameter tolerances for diameters up to and including— | | | | | | |
|------------------|-----------------------|-------------------|--|-----------|-----------|-----------|-----------|-----------|-----------|
| | From— | To and including— | 10 inches | 12 inches | 14 inches | 16 inches | 18 inches | 20 inches | 24 inches |
| | Inches | Inches | Inch | Inch | Inch | Inch | Inch | Inch | Inch |
| 64 | 1/2 | 1/2 | 0.0037 | | | | | | |
| | 1/2 | 1 1/2 | .0038 | | | | | | |
| | 1 1/2 | 3 | .0038 | | | | | | |
| 56 | 1/2 | 1/2 | .0037 | 0.0040 | | | | | |
| | 1/2 | 1 1/2 | .0040 | .0040 | | | | | |
| | 1 1/2 | 3 | .0040 | .0040 | | | | | |
| 48 | 1/2 | 1/2 | .0038 | .0041 | 0.0044 | | | | |
| | 1/2 | 1 1/2 | .0044 | .0044 | .0044 | | | | |
| | 1 1/2 | 3 | .0044 | .0044 | .0044 | | | | |
| 40 | 1/2 | 1/2 | .0038 | .0041 | .0044 | 0.0046 | | | |
| | 1/2 | 1 1/2 | .0046 | .0048 | .0048 | .0048 | | | |
| | 1 1/2 | 3 | .0048 | .0048 | .0048 | .0048 | | | |
| 36 | 1/2 | 1/2 | .0038 | .0041 | .0044 | .0047 | 0.0049 | | |
| | 1/2 | 1 1/2 | .0046 | .0049 | .0050 | .0050 | .0050 | | |
| | 1 1/2 | 3 | .0050 | .0050 | .0050 | .0050 | .0050 | | |
| 32 | 1/2 | 1/2 | .0038 | .0041 | .0044 | .0047 | .0049 | 0.0052 | |
| | 1/2 | 1 1/2 | .0046 | .0049 | .0052 | .0054 | .0054 | .0054 | |
| | 1 1/2 | 3 | .0054 | .0054 | .0054 | .0054 | .0054 | .0054 | |
| 28 | 1/2 | 1/2 | .0039 | .0042 | .0045 | .0047 | .0050 | .0052 | 0.0056 |
| | 1/2 | 1 1/2 | .0046 | .0049 | .0052 | .0055 | .0057 | .0059 | .0062 |
| | 1 1/2 | 3 | .0059 | .0062 | .0062 | .0062 | .0062 | .0062 | .0062 |
| 24 | 1/2 | 1/2 | .0039 | .0042 | .0045 | .0048 | .0050 | .0052 | .0057 |
| | 1/2 | 1 1/2 | .0047 | .0050 | .0052 | .0055 | .0057 | .0060 | .0064 |
| | 1 1/2 | 3 | .0059 | .0062 | .0065 | .0066 | .0066 | .0066 | .0066 |
| 20 | 1/2 | 1/2 | .0040 | .0043 | .0046 | .0048 | .0050 | .0053 | .0057 |
| | 1/2 | 1 1/2 | .0047 | .0050 | .0053 | .0056 | .0058 | .0060 | .0065 |
| | 1 1/2 | 3 | .0060 | .0063 | .0066 | .0068 | .0070 | .0072 | .0072 |
| 18 | 1/2 | 1/2 | .0040 | .0043 | .0046 | .0048 | .0051 | .0053 | .0057 |
| | 1/2 | 1 1/2 | .0047 | .0050 | .0053 | .0056 | .0058 | .0061 | .0065 |
| | 1 1/2 | 3 | .0060 | .0063 | .0066 | .0068 | .0071 | .0073 | .0077 |
| 16 | 1/2 | 1/2 | .0040 | .0043 | .0046 | .0049 | .0051 | .0053 | .0058 |
| | 1/2 | 1 1/2 | .0048 | .0051 | .0054 | .0056 | .0059 | .0061 | .0065 |
| | 1 1/2 | 3 | .0060 | .0063 | .0066 | .0069 | .0071 | .0073 | .0078 |
| 14 | 1/2 | 1/2 | .0041 | .0044 | .0047 | .0049 | .0052 | .0054 | .0058 |
| | 1/2 | 1 1/2 | .0048 | .0051 | .0054 | .0057 | .0059 | .0061 | .0066 |
| | 1 1/2 | 3 | .0061 | .0064 | .0067 | .0069 | .0072 | .0074 | .0078 |
| 12 | 1/2 | 1/2 | .0041 | .0044 | .0047 | .0050 | .0052 | .0054 | .0059 |
| | 1/2 | 1 1/2 | .0049 | .0052 | .0055 | .0057 | .0060 | .0062 | .0066 |
| | 1 1/2 | 3 | .0061 | .0064 | .0067 | .0070 | .0072 | .0074 | .0079 |
| 10 | 1 | 1 | .0044 | .0048 | .0050 | .0053 | .0055 | .0058 | .0062 |
| | 1 | 3 | .0061 | .0064 | .0067 | .0070 | .0072 | .0074 | .0079 |
| | 3 | 6 | .0084 | .0088 | .0090 | .0093 | .0095 | .0098 | .0102 |
| 8 | 1 | 1 | .0045 | .0048 | .0051 | .0054 | .0056 | .0059 | .0063 |
| | 1 | 3 | .0061 | .0064 | .0067 | .0070 | .0072 | .0074 | .0079 |
| | 3 | 6 | .0085 | .0088 | .0091 | .0094 | .0096 | .0099 | .0103 |
| 6 | 1 | 1 | .0047 | .0050 | .0053 | .0055 | .0058 | .0060 | .0064 |
| | 1 | 3 | .0062 | .0065 | .0068 | .0070 | .0073 | .0075 | .0079 |
| | 3 | 6 | .0087 | .0090 | .0093 | .0095 | .0098 | .0100 | .0104 |
| 4 | 1 | 1 | .0049 | .0052 | .0055 | .0058 | .0060 | .0062 | .0066 |
| | 1 | 3 | .0064 | .0067 | .0070 | .0073 | .0075 | .0077 | .0082 |
| | 3 | 6 | .0089 | .0092 | .0095 | .0098 | .0100 | .0102 | .0106 |

NOTE.—It is preferable to avoid the use of tolerances set in italics by choosing a shorter length of engagement, coarser pitch, or smaller diameter.



